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SINGAPORE MASS RAPID TRANSIT (SMRT): Operations and Revenue Cycle

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ABSTRACT

This paper discusses a case study for use in undergraduate accounting curricula. The case study presents students with an opportunity to apply their accounting information systems (AIS) knowledge in a real-world scenario by examining the provision of mass passenger transportation services in Singapore. The case offers students exposure to the services and utilities industry in a different cultural context compared to the USA. Specifically, it challenges students to (1) compare the revenue cycle of a merchandising firm with the revenue cycle of SMRT, (2) develop a context diagram of SMRT's revenue cycle, (3) verify revenue in the form of EZL transit card charges, (4) identify internal controls in the revenue cycle and related train operations that are supposed to, or should, exist, and (5) apply critical thinking to an accounting issue. This allows students to rise above a generic understanding of the revenue cycle, think critically about the interfaces between the revenue cycle and the train operations, understand how revenue data are generated in real-time, and determine how the physical view of train operations is mirrored in the logical view of its AIS. This case demonstrates that seemingly simple and comprehensible business operations can prove to be complex, and it provides students an opportunity to develop their understanding of AIS concepts at higher cognitive levels using the transportation services industry as a context.

Keywords:
Revenue Cycle, Transportation Services, Electronic Payment Cards, Services Operations

A teaching note and electronic files are available to faculty members for use with this case. If you are a member of the AIS Educator Association, please go to www.aiseducators.org, sign in to your account, select the Journal menu option and the last item listed provides a secure link to Instructor-only materials.

INTRODUCTION

Being able to learn concepts and techniques is a prerequisite to the development of a professional accountant. Undergraduate accounting curricula should be "underpinned by empirically-researched and informed examples and contexts that. . . equip would-be practitioners for the demands of modern accounting practice" (Cullen, Richardson, & O'Brien, 2004, p. 251). Most learning resources for accounting information systems (AIS) use commonly familiar contexts, such as a merchandising firm, for there is less time and space to incorporate relatively lesser known contexts (e.g., a services provider firm) within the discussion of AIS. For example, students are likely familiar with how a merchandising firm operates; presumably, there is little need to elaborate on the operational aspects of a retailer when discussing accounting for merchandise inventory.

Research has also shown that a majority of accounting students at different stages of their studies understand learning as being mainly about knowledge acquisition leveraged by memorization (Byrne & Flood, 2004; Lord & Robertson, 2006; Sharma, 1997). To overcome this condition, using case assignments in different ways in teaching is likely one approach to help in developing problem-solving and conceptual thinking (Hall, Ramsay, & Raven, 2004). By introducing a new environment and leaving out some information that students should look for in problem-solving, students can be challenged to deal with cognitive complexity. The use of case studies could fit with the different cognitive skills and qualities needed for professional progression (Romm & Mahler, 1991). The cognitive components of higher-order thinking skills include knowledge of facts, concepts, and procedures, along with an understanding of general and special conditions affecting the interpretation, interrelationships, and use of these facts, concepts, and procedures (Mayer-Sommer, 1990).

The transition from knowledge-level cognition (knowing the concepts) to comprehension (using the concepts in a different setting) is difficult to achieve. For example, if one knows about the revenue cycle of a merchandising firm, there is no assurance that he would be able to project the learning to a different context, such as a bank or railroad. Applying the same concepts across different contexts (1) enhances the understanding of the concepts learned, improving clarity in knowing the concepts, and (2) deepens practical insights gained in the subject. For example, a retailer usually expects some form of purchase order from the customer, but a passenger on a commuter train never submits a request to travel to the transportation utility.

The articulation of context in AIS often involves the business processes of the accounting cycle. This can be expected since the operations of a business are the primary sources of origin or use of data and of financial and non-financial risks. When the contextual setting is different from the most known contexts, comprehension of AIS-related aspects of the business can become challenging for the student. The understanding of business operations related to accounting cycles becomes crucial in knowing what data are generated or used, how such data are generated in tandem with the operations, and what risks emerge in the business operations (Raval & Fichadia, 2007; Wilkinson, Cerullo, Raval, & Wong-on-Wing, 2000). Jones and Lancaster (2001) suggest that students be introduced to process mapping in an AIS course to facilitate their understanding of business processes and help them visualize the interaction among functional areas. Presumably, the use of this real-world case in the transportation services context will enhance students' cognitive skills and help them better understand the role of business processes in an AIS.

PREREQUISITES

In providing context to the AIS, we focus on the revenue cycle for several reasons. The revenue cycle is very commonly covered in AIS; it is a critical AIS subsystem that accounting students are expected to know. Moreover, the routine operations of a business more obviously mirror the AIS cycles such as the revenue or expenditure cycles; however, this may not be so in some other cycles such as payroll and human resources. Within the revenue cycle, we nudge students to extend their understanding of the cycle in a different context, a mass transit system. For this case to be an effective learning resource, a basic understanding of the revenue cycle is essential (e.g., what data the cycle would capture, what information it would generate, and how its data and processes are documented).

Additionally, using this case requires a basic understanding of how electronic payment cards are used as media for payments. This is because passengers' most common means of fare payment is a debit card. The electronic payment cards have fast become a popular choice for the disbursement of money for products or services acquired. The ecosystem of the payment card has several stakeholders, including the card brand, card-issuing bank, merchant bank, vendors accepting payment via debit or credit cards, and consumer (Morse & Raval, 2008). Card brands (e.g., VISA) permit a card-issuing bank to issue electronic payment cards under their logo. The card-issuing bank (e.g., Citibank) issues cards to qualified applicants. The merchant bank is the bank of the consumer, processing payment on behalf of the cardholder. Sometimes, the card-issuing bank is the same as the merchant bank; however, the two logical roles identified under issuing bank and merchant bank remain clearly distinct.

LEARNING OBJECTIVES

The learning objectives of this case include requiring the student to:

A. Compare the revenue cycle of a merchandising firm with the revenue cycle of SMRT.
B. Develop a context diagram of SMRT's revenue cycle.
C. Verify revenue in the form of EZL transit card charges.
D. Identify internal controls in the revenue cycle and related train operations that are supposed to, or should, exist.
E. Apply critical thinking to an accounting issue related to the revenue cycle.

STUDENT CASE MATERIAL

This case is organized into four parts. Part I introduces the company, Singapore Mass Rapid Transit (SMRT), and discusses its business operations related to mass transit. Part II presents two major fare options, paper tickets and the EZ Link transit card. It introduces EZ Link payment cards and discusses how such cards are used in SMRT's revenue generation. Part III presents SMRT's revenue cycle. To clarify the revenue generation process, an overview flowchart of a passenger's ride using EZ Link card is included. Part IV discusses some of the risk exposures in SMRT's revenue cycle.

I. Singapore Mass Rapid Transit (SMRT) and Its Operations

A cosmopolitan society, Singapore is known for its cultural diversity. Forty percent of Singaporeans are foreign-born, compared to other internationally diverse cities such as Dubai (89

percent) and Toronto (49 percent) (Khanna, 2015).[1] The city-state blends Malay, Chinese, Indian, Arab, and English cultures. The four official languages of Singapore are Mandarin, Malay, Tamil, and English. Because of its global business involvement, English has been the *de facto*, the language for commerce and trade. As one of the so-called "Four Asian Tigers," Singapore's enormous growth since the 1960s has made it the world's fourth largest financial center, and its harbor is among the busiest ports in the world. Singapore is an economic giant supported by financial services, shipping, crude oil refining, tourism, and the electronics and chemical industries. The city-state has the third-highest proportion of millionaire households in the world. Singapore also has the highest gross domestic product per capita in the world at $56,532.[2]

Naturally, a high population density (8,274 people per square kilometer in 2018) combined with more than 17 million international visitors annually means Singapore faces a unique set of transportation challenges from curb pollution to traffic congestion. The number of private cars on the road is restricted by stringent government-regulated car ownership quotas. Only one in 8.25 residents owns a car, although many of the residents can afford it.[3] Therefore, the burden of providing efficient and broadly available commuter transportation rests on the government. To facilitate mobility, it attempts to make public transportation easily accessible, safe, reliable, comfortable, and relatively inexpensive. As Singapore's Land Transport Authority once put it, "…a high standard of [local] transport enhances the quality of life, is good for economic growth and helps us maintain our competitive edge. . . ."[4]

The publicly listed Singapore Mass Rapid Transit Corporation (SMRT) was incorporated in early 2000.[5] The public train transport system is run by two companies: SMRT Corporation operates Mass Rapid Transit (MRT) and public buses, and its subsidiary, SBS Transit, operates Light Rail Transit (LRT), which takes people almost directly to their neighborhoods. Like most transportation utilities, these areas of operations are regulated. With an average daily MRT ridership of 2.76 million in 2014, MRT forms the nucleus of the rail network. This case focuses primarily on MRT.

SMRT's business segments dedicated to transportation services create value by helping people get to wherever they need to be. Two major costs that the company incurs for its operations have to do with the network of trains that it maintains (depreciation, repairs, and maintenance) and its employees (wages). Most of these costs are fixed or semi-fixed in relation to the volume of train operations. SMRT's revenue is quite "liquid" and comes from passengers (fares), while some of the major expenses, such as depreciation on the train infrastructure, do not require cash outlay in the year the expense is recorded. In contrast, personnel costs are essentially recurring costs each accounting period, require cash outlay, and are largely fixed relative to train operations volume. Almost all the revenue is variable. With many fixed costs, achieving revenue volumes high enough to maintain an adequate margin of safety (that is, revenue more than the break-even point) is a key factor in generating positive earnings over the years.

There are currently five lines in operation within the MRT network: North-South, East-West, North-East, Downtown, and Circle Line. SMRT operates more than 100 trains daily from about 5:30 a.m. until 1 a.m., with intervals of approximately three to eight minutes to service almost 100 stations within the MRT network. Every station is equipped with general ticketing machines (GTMs), a passenger services center, and LED and plasma displays that show train service information and announcements. The multifunctional GTMs take care of many of the passengers' ticketing needs: buying paper tickets with cash or a charge card, getting refunds of deposits, checking the value stored on EZ Link cards, adding to the cash balance of, or "topping up" existing EZ Link cards, and viewing past transactions (see Part II for a detailed discussion).

Fare regulation and bus service standards are under the purview of an independent body, the Public Transport Council (PTC). In contrast to the use of fare zones in other subway systems (e.g., London Underground), the network's approach to fare setting can be called incremental, based on approximate distances between stations. Since Singapore's public transport system is fully integrated, commuters need to pay only one fare and pass through two fare gates (once on entry, once on exit) for an entire journey, even when transferring between lines operated by different companies within SMRT.[6] While concessionary fares are in place for senior citizens and students, we limit the scope of this case to the vast majority of other travelers, including adult resident travelers and visitors from overseas.

A passenger can make up to five transfers within a single journey, with a 45-minute allowance between each transfer; the train network should be entered and exited only once in a journey, regardless of the number of transfers sought by the passenger. Depending on the distance traveled, journeys within the MRT/LRT network need to be completed within the set time limits.[7] If the time limit is exceeded, the previously paid fare becomes void and access to the platform area will be denied by the fare gates. The passenger should return to a GTM and purchase a new fare.

II. Two Major Fare Options

Nearly all Singaporeans take the train almost every weekday for work, while others travel for personal purposes. Because these commuters take the train routinely, almost all of them own a payment card, called the EZ Link transit card (EZL), which we discuss below. EZL is a debit card; that is, it is a card with money "loaded" on it so that it can be spent (electronically withdrawn by the service provider right away).

Visitors and those who travel occasionally may purchase a paper ticket for a single journey or for multiple (but limited number of) trips. Except for very few cash transactions, the rest of the revenue is collected through a third-party electronic payment system that processes EZL transactions.

EZ Link (EZL) Transit Cards

A debit or credit card is a card that facilitates cashless payment for products and services. A debit card must have sufficient balance to honor a payment, while the credit card allows the owner to charge on the card and pay the total amount due following the agreed-upon terms of payment to the card-issuing institution. The charges on a debit card are paid instantaneously and the balance on the card is reduced by the amount paid. The EZL transit card is essentially a debit card dedicated to traveling on the transit network; however, it can be used for purchase of products or services from other vendors who accept the card for electronic payment.

The payment card ecosystem for SMRT is designed to serve the organization's unique needs for cash collection and revenue recognition. The Land Transport Authority (LTA), a statutory board under the Ministry of Transport, spearheads land transport development and oversight in Singapore. Its wholly-owned subsidiary, EZ Link Private Ltd., acts as the "approved holder" of any value stored on EZL. It has appointed Citibank Singapore as the "approved bank"–the card-issuing bank–that can be held fully liable for any value stored on an EZL. While the EZL is accepted by many other vendors, it is a common means for fare payment on the SMRT transportation network. In recent years, several credit card issuers have also experimented with stored value cards, which function like a debit card and can provide payment services like the EZL card.[8]

EZL is by far the most popular medium to pay fares within Singapore's public transport system. There are currently more than 10 million EZL cards in circulation, with more than 4 million card-based transactions occurring daily. The card can also be used to pay for goods and services at selected merchants. Each card has a unique ID so that, for example, prior journeys and purchases can be tracked. Cards are available for purchase at any SMRT Ticket Office, SMRT Passenger Services Center, and 7-Eleven stores located at train stations. A fixed fee of S$5 (Singapore dollars) is collected when the card is purchased. For example, if you want a S$20 balance on a newly issued card, you would pay S$25. The stored value can be increased, or "topped up," and carries no charge – the entire amount you pay is added to the card balance. No personal information is required to purchase the card; however, you may choose to register your card, in which case you will provide personal information related to the card (card owner's name, for example). In turn, the registration allows the card owner access to various resources and applications, such as EZ Reward (program rewarding cardholders' loyalty), EZ Manage (cardholders can check their transaction history (transit and retail) and block stolen or lost cards), and EZ Protect (free insurance program that protects registered cardholders up to S$10 from unauthorized usage of a stolen EZL card).

Once in circulation, EZ Link cards can be topped up at any station (using a GTM or Passenger Services Center), at a 7-Eleven convenience store located in most train stations, or online via EZ Reload (discussed next). To use an EZL card within the public transportation system, a minimum amount of S$3 needs to be available for use on the card before the cardholder can start a journey. This minimum balance ensures that the passenger has the required fare at the time of exiting the gate at the destination station, even for the longest train journey. In case of insufficient funds for travel, it would be necessary to add value to the card prior to beginning the journey. To avoid having an insufficient balance, the cardholder may choose to purchase additional credit via an automatic recharge service called EZ Reload. These recharges are initiated whenever the fund balance on the card reaches a preset low value. The automatic recharge triggers an EZ Link notification by the system to the cardholder via email.[9] Moreover, every EZL cardholder has access to an online service called EZ Online, where commuters can view their past transaction records, download discount coupons from merchants onto their cards, and shop at selected online merchants using the EZL card. It is important to note that SMRT does not accept any credit cards for direct payment of train fares; however, you may use approved brands of credit cards to load or reload your EZL card.

EZL cards will typically expire five years from purchase. When value is added to the card, the five-year expiration date is extended, subject to a maximum of two years. All cards found to be faulty within five years from date of issue can be replaced free of charge with a new one, so long as the card has not been tampered with, carelessly handled, or intentionally damaged.

Paper Tickets

Paper tickets are for one-time use only and can be purchased at a GTM. The fare must be paid when the passenger purchases the ticket. Because the fare to be paid is calculated using the distance between the origin and destination of the trip, it is essential for the person to know his destination when buying the ticket and to pay the fare that is marked for that specific journey. In contrast, if you are using the EZL card, the system does not require you to declare your destination even after you begin the journey; you may get off at any station and the system will calculate and charge you the fare on your EZL card accordingly. Otherwise, the travel experience is the same whether the passenger uses EZL or a paper ticket.

The GTM's touch-screen monitor and touch-sensitive map of the MRT network facilitate the selection of a destination station, which triggers an automatic calculation and display of the applicable fare. Upon payment of the fare, a paper ticket, in the form of a contactless smart card, is issued by the GTM to the passenger. The single journey ticket is valid only on the day of purchase and has a time allowance of 30 minutes beyond the estimated travelling time between the destination and starting stations.

Although the volume of passengers using paper tickets is relatively small compared to the volume of EZL card passengers, SMRT is concerned about possible reuse of paper tickets. Additionally, environmentally-conscious SMRT wants to motivate paper ticket holders to recycle the ticket upon completion of the intended journey. To incentivize the traveler, the paper tickets cost an extra dollar when purchased, as a deposit, which will be returned to the traveler if the used ticket is deposited back into any GTM within 30 days from the purchase of the ticket. But visitors who purchase paper tickets may forget to collect their deposit or may not be attentive about the deposit amount and how to retrieve it, while residents may be more alert about seeking the refund.

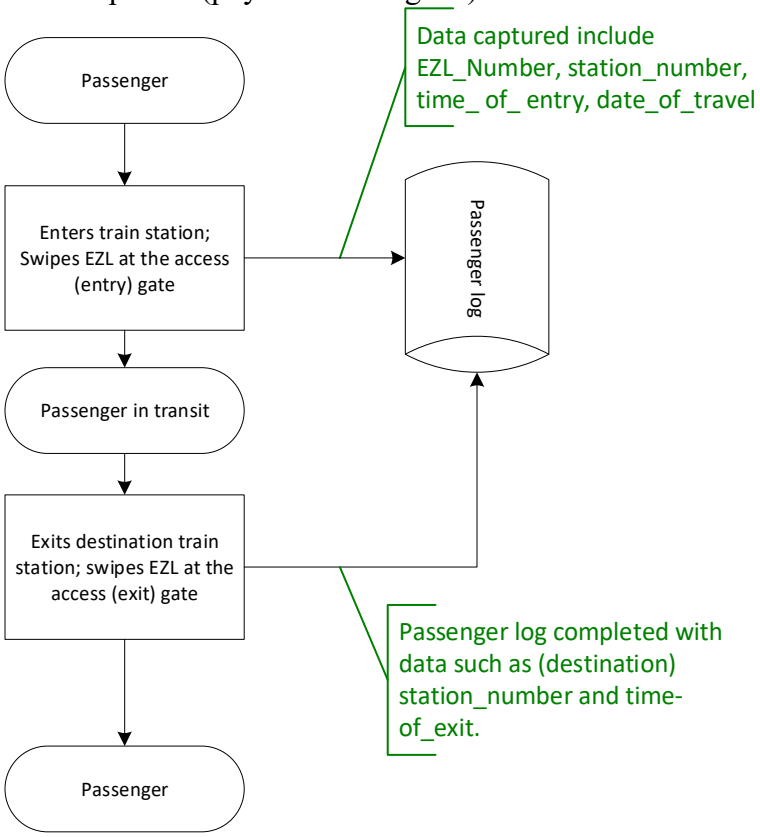
III. SMRT's Revenue Cycle for Transportation Services

In a manufacturing or retailing environment, the revenue cycle has four subsystems (Romney & Steinbart, 2014): sales order, order fulfillment (shipping), billing, and collection (cash receipt). A primary activity in each, respectively, is: obtain sales order, complete the obligations under the order, invoice the customer, and collect cash. In the services area, such as train travel, you buy the ticket first, then you travel from origin to destination. The purchase of a ticket or its equivalent results in a cash receipt for SMRT; however, the commitment to provide travel services is completed only when the passenger reaches the destination station. Until then, the purchase of a ticket, strictly speaking, is a prepayment (revenue received in advance). Note, however, that this time period – particularly for paper tickets – may be very short, perhaps no longer than the amount of time required for travel to the destination.

An interesting question is: How does the train operation capture revenue earned? For this purpose, train stations are typically divided into two areas: paid and unpaid. Access to the paid areas is restricted by fare gates, also known as access control gates, which greatly facilitate the assurance that the fare has been or will most likely be collected from those who enter the paid (train) area.[10] Directly linked to SMRT's computer systems, access control gates can create, read, or update electronic records of passenger travel. Each gate can hold up to 50,000 transactions in its local data storage. Colorful LED displays show the operating status of the gates so that commuters can easily determine whether a gate serves as an entry or exit gate.[11]

Every SMRT train station has an unpaid area that is open to prospective travelers. The paid area is defined using controlled access gates. A person cannot enter the paid area – or train operations area – without prepaying in some form (i.e., buying a paper ticket or having enough balance on the EZL card). Once you are "in," you are a passenger in transit. When you exit at the destination, you are leaving the physical boundaries of SMRT, thus completing the journey. The passenger's presence in the system is noted when the EZL card is swiped at the entry gate; the journey is complete when the passenger swipes the same card at the exit gate at the destination. Upon exit, the passenger is no longer physically present within the train operations or logically in SMRT's information system. The exit at the destination determines the final fare and charges it to the passenger's EZL card. At this stage, the revenue is earned. A simplified flow chart of the train travel is shown in Figure 1.

Figure 1: A Simplified (physical and logical) Flowchart of Travel Using EZL



How do fare gates (entry and exit gates) work with the tickets to capture existing data or generate new data? If you are traveling with a paper ticket, the ticket needs to be inserted into a reader device at the entry gate at your origin and then again at the exit gate at your destination. The SMRT system performs some tasks in a split second (about 0.20 second); for example, it would likely log the originating station code, your starting time, and the date. Using an EZL card is as simple as using any other ticket option. It grants users access to the train platforms with a simple tap on a fare gate at the entry station; a transaction log is initiated for your journey.[12]

When you tap your card on the card reader mounted on top of the exit gate at the destination, the fare is automatically calculated and deducted from your EZL card and the transaction log is completed, for the journey is now over.

It is important to distinguish between a cash collection event and a revenue recognition event for both ticketing options: EZL card and paper tickets. Since the EZL card is a debit card, the cardholder adds value ("tops up") in any amount believed to be necessary for future use. Any time an upload of cash to the debit card occurs, including when using a GTM, the cash belongs to the card-issuing company. When a passenger travels using the EZL card, the commitment of the fare charged becomes revenue for SMRT. The card-issuing company remits this amount to SMRT periodically. For paper tickets, all cash received (except the deposit) coincides with revenue recognition for three reasons. First, the amount paid is for a certain travel only; second, the travel needs to happen within a fairly short period of time following the purchase of a ticket; and third, money is not refundable (except the deposit).

IV. Risk Exposures

The train operations of SMRT face several risk exposures related to the revenue cycle, including:

- Non-availability of services.
- Non-availability of computer-based systems and networks.
- Risk of over- or under-charging the fares.
- Incomplete or inaccurate data.
- Theft of cash.

If the rail services are "down," the revenue is lost until services resume. Train services could be disrupted due to various reasons, such as collision between trains, derailment, or power outage. Downtime directly impacts the revenue performance of SMRT. More important, the city comes to a standstill, for other forms of transportation are limited and probably overcrowded during disruption in train operations. Singapore, and therefore SMRT, owes reliable and continuous service to its residents and visitors. SMRT's 2016 Annual Report (p. 46) notes that their Mean Kilometer Between Failure for delays lasting more than five minutes improved from 65,000 km in 2012 to 140,000 km in 2015. Accidents happen, but SMRT is striving to improve reliability.

SMRT's revenue generation and data capture is heavily automated. If the computer-based networks are unavailable, data capturing devices (e.g. entry gate, exit gate) may not work unless backup power is available. The cause of disruption could be other than electricity. For example, the hardware or firmware on entry/exit gates is not working properly.

The fares SMRT charges are a part of the system that counts fare at the GMT and at exit gates. Fare charges would be inaccurate if someone made unauthorized changes to the fare table stored in the system. Undercharging results in loss of revenue, while overcharging may cause a significant effort to return the fare difference to passengers entitled to the refund.

It is also likely that data could be missing, incomplete, or inaccurate. Reading errors can occur at the entry or exit gate. Also, some travelers could enter the train area without scanning their EZL card or logging the paper ticket at the initiation of a journey. In such cases, it would be impossible to determine the proper fare to charge because of missing data.

Finally, cash is the most liquid of all assets. Theft of cash from GTMs is likely unless proper controls exist to detect or prevent such compromises.

CASE REQUIREMENTS:

A. Based on the case discussion and your knowledge of AIS, complete the comparison between the revenue cycle of a merchandising business and of SMRT. Use Table 1 below to provide your answers and re-sequence the steps, if appropriate.

Table 1: A Comparison of the Revenue Cycle of a Merchandising Firm and SMRT

Subsystem of a merchandising firm	Sequence	Equivalent revenue cycle subsystem at SMRT	SMRT numerical sequence. (See note below).
Sales order cycle	1		
Order fulfillment (shipping)	2		
Billing	3		
Cash collection	4		

Note: If a step is not applicable, simply state "N/A."

B. Based on the information provided in the case, develop a context diagram of SMRT's revenue cycle. Note: SMRT has revenues from train operations and other services; this requirement refers only to the train operations revenue cycle.

C. Verify revenue and cash collections charged on the EZL card. The EZL card-issuing company sends SMRT a recent statement of daily fare collected on EZL cards from passengers. To verify if the amount is reasonable based on operational data, you should plan to calculate the amount (of fare collected) independently using the following two tables. Table 2 lists the number of journeys between any two stations based on exit and entry gate scans (please note, this is only a representative illustration, and not all stations on the train network are included). Table 3 is the fare table for travel between two stations (again, this is illustrative only). You are to calculate the amount of revenue that should have been collected by the EZL card-issuing company.

Table 2: Journeys Between Two Stations by EZL Cardholders (in thousands)

Station: Origin\Destination	HF	CT	DG	MS	JE	TL	BP	CA	PG
Harbour Front (HF)	(500)	40	150	50	20	30	30	90	90
Chinatown (CT)	80	(600)	200	60	30	40	40	70	80
Dhobi Ghaut (DG)	90	190	(800)	60	40	60	80	110	170
Marina South Pier (MS)	10	10	30	(100)	10	10	10	10	10
Jurong East (JE)	10	20	40	30	(150)	10	10	20	10
Tuas Link (TL)	5	5	10	5	5	(50)	5	10	5
Bukit Panjang (BP)	5	5	25	5	5	5	(60)	5	5
Changi Airport (CA)	5	5	30	5	5	10	5	(70)	5
Pungoll (PG)	4	4	10	4	4	6	3	5	(40)

Note: Entry gate count is shown in parentheses.

Table 3: Fare Table (one-way journey)

Station	HF	CT	DG	MS	JE	TL	BP	CA	PG
Harbour Front (HF)	X								
Chinatown (CT)	0.40	X							
Dhobi Ghaut (DG)	0.60	0.50	X						
Marina South Pier (MS)	0.70	0.60	0.50	X					
Jurong East (JE)	0.80	0.70	0.60	0.55	X				
Tuas Link (TL)	1.00	0.90	0.80	0.70	0.65	X			
Bukit Panjang (BP)	1.20	1.10	1.00	0.90	0.80	0.70	X		
Changi Airport (CA)	1.40	1.20	1.10	1.00	0.90	0.80	.70	X	
Pungoll (PG)	1.50	1.30	1.20	1.10	1.00	.90	.80	0.70	X

Note: All fares are for EZL cardholder traveler, denoted in Singapore dollars.

D. Identify internal controls in the revenue cycle and related train operations that are supposed to, or should, exist.

E. Apply critical thinking to the following accounting issue related to the revenue cycle: Deposit on paper tickets is a current liability. To simplify accounting for deposits, the controller of SMRT suggests the following: "The maximum amount SMRT would be liable for is for the deposit on paper tickets issued within last 30 days, minus the number of these tickets on which the deposit is already claimed by the passenger. Any unclaimed deposits remain (as a gain) with SMRT. Based on past data, we can reasonably estimate what percentage of tickets will be returned for deposit. Historically, if 90% of tickets are not returned within 30 days, SMRT should record only 10% of the deposits as a current liability. The rest goes to the ticket revenue recognized on paper tickets. I suggest we use this percentage (10% in the example here) to record the deposit liability."
What do you think? Do you agree with the controller?

RESOURCES

Please use the information provided in the following sources to familiarize yourself with the SMRT and its operations:

- https://www.smrt.com.sg/News-Room/Annual-Reports
- http://home.ezlink.com.sg
- https://www.facebook.com/myezlink
- http://www.transitlink.com.sg/images/eguide/mrt_sys_map.htm
- http://www.publictransport.sg/content/dam/publictransport/Distance%20Fare%20pdf/Quick%20Guide%20to%20Distance%20Fare-EN.pdf
- http://app.ptc.gov.sg/get_content.aspx?id=news050811111041
- http://www.transitlink.com.sg/
- http://www.smrt.com.sg/Portals/0/PDFs/rts-regulation.pdf
- http://www.smrt.com.sg/AboutSMRT/InvestorRelations.aspx

Acronyms used in the case:

Acronym	Description
AIS	Accounting Information System
EZL	EZ (Easy) Link
GTM	General Ticketing Machine
LRT	Light Rail Transit
MRT	Mass Rapid Transit
SMRT	Singapore Mass Rapid Transit
PTC	Public Transport Council
SGX	Singapore Stock Exchange

CASE DEVELOPMENT AND FEEDBACK

During the authors' visit to Singapore in 2011, the motivation for writing the case study came from several sources: great experience with the train services; impressive integration of technology, data, and operations; international accounting environment; excellence in embedding payment cards into the revenue cycle; and the services (as distinguished from the manufacturing) industry. While the many train trips taken provided the experience, the SMRT website, other web-based resources, and the help and guidance of a local professional accountant all converged into the SMRT case study. First written in 2012, this case was initially used at a midwestern university in an AIS class for six semesters, beginning with Fall 2013. As the SMRT organization further evolved (for example, in adopting NFC technology), the case was reviewed and updated. However, for the most part, the core material in the case study has remained the same. In line with the case objectives, students perceived that the case provided them an improved understanding of how business operations at SMRT are integrated with its revenue cycle.

REFERENCES

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[1] Presumably, Dubai attracts all skill levels, Toronto may be more selective, and Singapore seeks talents, professionals, and highly-skilled people among the foreign-born. The statistics here represent the ratio of foreign-born to total population and are unlikely to capture all dimensions of diversity.
[2] Shibani Mahtani, Wealth Over the Edge, *WSJ Money*, Spring 2013, 34-41.
[3] The government maintains disincentives for residents who plan to own a car; for example, a car can only be purchased through an auction, prices are generally steep, and ongoing operating costs (e.g., toll charges) are significant.

[4] A World Class Land Transport System – A white paper, Land Transport Authority, Singapore, 1996. https://www.lta.gov.sg/content/dam/ltaweb/corp/PublicationsResearch/files/ReportNewsletter/White-Paper.pdf, accessed July 19, 2017.

[5] Detailed financial statements, prepared using Singapore Financial Reporting Standards, are available in the investor relations section of SMRT's official website, www.smrt.com.sg. The company is listed (Ticker symbol: SMRT) on the Singapore Stock Exchange (SGX).

[6] In case passengers decide to extend a trip mid-journey, they simply pay the difference upon exiting their destination station.

[7] The set time limits are as follows: Exit 1 to 4 stations away = 40 minutes; Exit 5 to 9 stations away = 60 minutes; Exit 10 to 15 stations away = 75 minutes; Exit 16 to 24 stations away = 100 minutes; and Exit over 24 stations = 120 minutes.

[8] There are two variations of such arrangements. One option allows the credit card issuers to create an eWallet, much like the EZ-link debit card, within the credit card, where an alternative to the EZ-link card is housed. This eWallet works for SMRT rides as well as any other purchases of products or services; that is, wherever the EZ-link card is accepted. When the balance in the debit card goes low, the credit card automatically generates the transfer of funds to the debit card. The second option for the credit card issuers is to create a debit card dedicated to the SMRT services only; funds from this eWallet cannot be used for acquiring any other products or services. For the train operations revenue data capture, there is no difference in treatment of such cards, so we refer them all as EZL.

[9] To initiate the reload service, the EZ Link cardholder must apply for EZ Reload through either his bank or the EZ Link website. Upon approval, the cardholder receives a code to activate the EZ Reload function at any GTM or ticket office.

[10] Most stations have additional commercial space outside of the train area for supermarkets, convenience stores, food courts, ATMs, and self-service automated kiosks for myriad services. While commercial space is easily accessible for anyone, passengers must enter the paid area to board a train.

[11] SMRT's compact and lightweight mobile fare gates are easy to transport to any location and can be configured as standalone gates for easy set-up to manage abnormal traffic volumes during popular events (e.g., Chinese New Year celebration).

[12] Once a stored value card, such as EZ-link, is used to commence a journey, the same card cannot be used for or by anyone else to begin a journey, for the card once used actively tracks the cardholder's journey.